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A multi-disciplinary, holistic approach to networked learning research:

A critique of a large-scale empirical study into student online learning experiences

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ABSTRACT

In this paper, we present our collective reflections on the methodological and collaborative experiences embedded within a cross-disciplinary study of student online learning experiences. The paper will present the theoretical underpinnings for the research design, describe the chosen framework and methods, and identify methodological issues and lessons arising from the implementation of this research. In addition, we will show how the workings of the multi-disciplinary, distributed research team and collaborative methods contributed to the project and to building research capacity in subject communities.

Keywords
Methodology, student experience, mixed-methods, multi-disciplinary

INTRODUCTION

This paper focuses on a recent evaluation of students' experiences using Virtual Learning Environments as part of their studies within a number of subjects in universities and Further Education colleges in the United Kingdom. The term Virtual Learning Environment or VLE has been in use for approximately five years to describe online learning environments, which have emerged and developed over that period. Although initially these were characterized mainly in terms of their technical components (e.g. Britain & Liber, 1999) a more recent definition from the UK Joint Information Systems Committee (JISC) shows how the emphasis has shifted towards the learners themselves in defining a VLE as 'the component(s) within an MLE [Managed Learning Environment] that provides the 'online' interactions of various kinds, which can take place between learners and tutors, including online learning.' (JISC, 2002).

The Student Online Learning Experiences (SOLE) project was funded by the Learning and Teaching Support Network and JISC within a context of rapid growth in the use of VLEs and a continuing emphasis on staff rather students needs (Armitage et al, 2001, Stiles, 2002). When the project began in Autumn 2002, there were few, if any, studies focussing on student experiences of VLEs. Since then, a few examples have been published (e.g. Breen, 2002, Aspden et al 2003), although these have tended to focus on individual institutions. By contrast, SOLE has adopted a subject-based approach investigating student experiences with VLEs in five subject areas (Education, Psychology, Information and Computer Science, Economics and Hospitality. Leisure, Sport and Tourism). It aimed to draw out the effectiveness of VLEs in supporting different subjects, current national agendas and student learning.

HOLISTIC RESEARCH DESIGN

An "Eclectic-Mixed Methods-Pragmatic Paradigm"

The emerging consensus on approaches to evaluation studies of networked learning centers on the need for a variety of methods, due to the complexities and multi faceted nature of networked learning and teaching (e.g. Phillips et al, 2000; Oliver & Conole, 1998). Whilst there has undoubtedly been a shift towards the Constructivist-Interpretive-Qualitative Paradigm (Guba & Lincoln, 1989 and Patton, 2002), Phillips et al (2000) argue that in undertaking learner-centered evaluation of networked learning an "Eclectic-Mixed Methods-Pragmatic Paradigm" will be most applicable. The focus of this approach is on practical problems, acknowledging that there is a weakness in all evaluation tools, so that quantitative and qualitative methods are required.

In this study, a holistic approach was adopted, drawing on illuminative and integrative methodologies espoused by Parlett & Hamilton (1977) and Draper et al (1996) and phenomenographic approaches (Marton & Entwistle, 1984) where data is collected directly from learners themselves through self reporting and interviewing. Robin Mason (1995, cited in Oliver & Conole, 1998) has previously advocated a "holistic" approach to evaluation in which the broader effects of learning technology innovations such as contextual and institutional effects are included in the design rather than retaining a narrow focus on learning outcomes. Our approach is to an extent, in line with this, although the holism in the case of SOLE refers to the student experience rather than the innovation, namely the virtual learning environment in this case. As such, our methodology is aligned most closely with the learner-centered framework for whole project evaluation advocated by Phillips et al (2000). They identified four distinct phases for learner-centered evaluations: Analysis and Design, Development, Implementation and Institutionalization. The Implementation phase which focuses on learning process, learning outcomes and innovation appropriateness fits the focus of the SOLE research. In addition, some consideration to institutional issues was included in order to contextualise the research. The SOLE framework excluded in depth consideration of learning objectives and outcomes. Where these were considered, this was in terms of student perceptions of their learning and as part of the examination of the intended and unintended learning models. Evaluating and measuring the impact of technology on learning outcomes is a

particularly difficult and contentious area of evaluation research. Laurillard (1994) in a paper on whether learning technologies can improve learning, reports that most studies simply end up concluding *"it depends"*, leading Laurillard to emphasize that the learning context is critical to whether learning technologies are successful. The contextual issues have therefore been at the forefront of our concerns in this study. One particular area that the research questions focussed on was in identifying issues that impact on motivation. The methodology drew upon a model of the motivational context for virtual learning (Cook & Timmis, 2002). Cook & Timmis identified four domains of influence within the motivational context: the personal domain, study environment, online environment and learning activities domain and these has been used to isolate positive and negative factors students identified as impacting on their motivation when working with a VLE. Finally, it should also be made clear that no attempt was made to compare the different VLEs being used in the case studies. Figure 1 encapsulates the key elements of the contextual framework.

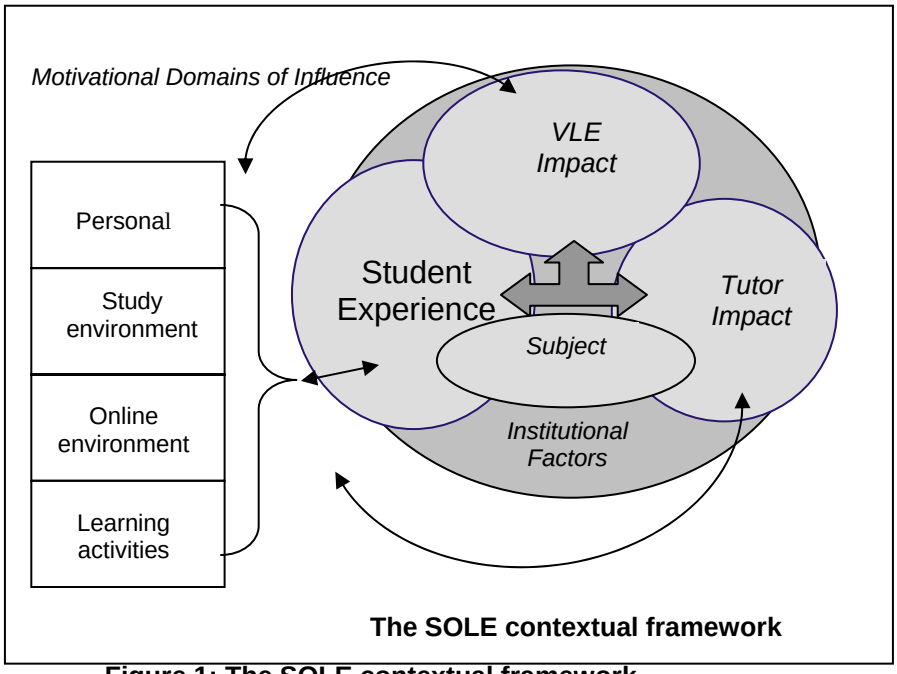

Figure 1: The SOLE contextual framework

The key research questions identified for the team to investigate can be broadly categorized under the following headings: learning models, motivation and confidence, student and tutor roles, communication, use of resources and available support and a summary of these has been set out below in Table 1.

SUMMARY OF SOLE RESEARCH QUESTIONS	
Learning Models	*What is the implicit learning model, what is the explicit learning model and what is the actual tutor and student behavior?* *How far is the VLE embedded within the pedagogical model and actual teaching and learning activities?* *How much time (online and offline) do students spend working on VLE units?*
Motivation and Confidence	*What factors do students identify as affecting their motivation positively or negatively? Can any of these be attributed to the VLE itself?*
Student and tutor roles	*Who is/what is the role of the tutor? What is the role of the student? How do these relate to the implicit, explicit, actual model of learning? And to student participation in the VLE?* *Are we able to identify issues around authority (of knowledge; of expertise; teacher-student communications) in relation to VLEs?*
Communication	*How do students choose to communicate (how? when? why?) and for what purposes?* *How do the VLE tools support this?*
Use of resources	*What resources are the students making use of? What patterns of use can be identified?* *How do students use the VLE toolkit? (Which elements? including assessment tools and*

	feedback mechanisms.)
Support for students and staff	*How do students and tutors use and perceive the various forms of support available. How important do tutors think support is and what is their understanding of student preferences?*

Table 1: Summary of SOLE Research Questions

Case Study Design

Within the five subject areas, ten case studies in Higher Education (HE) were identified (in two institutions per subject area, and of one unit per institution) and two in Further Education (FE). It was agreed to undertake the FE studies as pilots to evaluate the effectiveness of the methodology for use in FE. This part of the study is ongoing and will not be reported on here. Of the ten case studies identified for HE, one had to be cancelled due to illness and is currently being reinstated. The remaining nine case studies all took place and in depth reports on the findings from these are available from the SOLE web site.[1]

The sample of case studies were identified according to several criteria:

- The case studies would represent a balance of pre and post 92 universities (the actual balance was 4 pre 92 to 5 post 92);
- They should be well distributed geographically (in fact case study sites were limited to England but with sites in most regions apart from the South West and East Anglia.);
- At least 4 VLE products including bespoke or open source systems would be represented (Actual products included in the studies were Blackboard, WebCT, Merlin, StudyNet, Lotus Learning Space);
- The VLE should be embedded in the course for more than a document repository to ensure that there was a range of pedagogic strategies, VLE tools and interactions to study;
- Whole groups of students would be studied;
- Subject teams would focus on first or second year groups, although it was agreed that Education studies would include postgraduates (although in fact one study was based on a year 2 B.Ed group);
- Students with little or no previous experience of VLEs would be targeted.

METHODS REVISITED

In this section we will provide an overview of the methods and instruments used in the SOLE study, their purpose and relationship to the research questions outlined above. In addition, we will evaluate the methods used, how they worked together and how well they helped us to achieve our aims of finding out about student learning.

The primary data gathering tools were developed using a matrix approach ensuring that there was a close correlation between research questions, methods and individual instruments. The core sets of instruments were: questionnaires, diaries, interviews, discussion board and transaction log data, and supporting documentation.

Questionnaires

Two questionnaires were designed for students to complete at the start and end of the unit. The first questionnaire included questions on student characteristics such as age, gender, first language and country in which they were educated. Some questions were repeated to allow us to track changes over time such as confidence levels across a range of factors using a five point Likert scale and a motivation scale where students were asked to rate their level of motivation towards the course at the start and end.

[1] See http://sole.ilrt.bris.ac.uk

The questionnaires also included questions designed to uncover factors associated with initial motivation towards the unit (primarily the personal domain) and at the end of the unit factors which had influenced their motivation positively or negatively (all four domains) or not at all during the unit they had just finished. A series of open ended questions were also included to uncover student views on induction, support, experience, positive and negative factors.

Was this an effective method? It was very successful in helping to identify across the whole cohort (and some of the case studies were for large student groups of 100+) characteristics, levels of confidence, experience using VLEs and motivation levels. The questionnaires were less effective at tracking changes over time as in many of the case studies, the number of matched sets was very low due to the number of students absent on one or other or both occasions, something we had not really anticipated would be such a major issue. For example, in case study 7, 99 students out of a potential 217 students completed questionnaire 1, for questionnaire 2, this dropped to 26 and only 13 completed both questionnaires. As an aside - a review of the levels of absenteeism across all the cases could be a worthwhile exercise in itself. The small number of valid cases prevented us undertaking some of the intended analysis in some if not all case studies, for example looking for correlations between initial motivational drivers and factors students reported as having a positive or negative impact on their motivation during the unit. In some cases it also meant that where students had been absent for questionnaire 1, we did not have corresponding data on their characteristics and one recommendation for any further case study design of this nature would be to include questions about characteristics on both questionnaires to account for this. The other area to note on the effectiveness of the questionnaires is in the quality of the open-ended responses received. In many of the case studies, these were poorly completed or not completed at all and the data from these has not been as helpful in triangulating with interview data as we would have liked. The most likely explanation for this is the fact that these questionnaires were completed during the early part of one of their first face-to-face sessions and perhaps the students were anxious to get the data collection over with so that the class could begin. In addition, the answers from students in the bigger groups were also noticeably less complete where administering these questionnaires was more of a logistical challenge and perhaps the atmosphere might have been less conducive to thoughtful answers. Clearly, this has to be set against other considerations such as whether allowing students to complete questionnaires out of class would bring in a better or worse rate of return. Nevertheless it perhaps means that in future studies, greater steps should be taken to ensure that students have sufficient time and mental space to reflect upon the issues on which we would like to hear their views and thoughts.

Self Reporting Diaries

One of the key areas the SOLE team wanted to investigate was what the students were actually doing when working with VLEs. Before the advent of online working and the need to take account of multiple locations and asynchronous discussion and other time-flexible activities, observing students in situ was an obvious and appropriate method used by many researchers (see Draper et al, 1994). Equally, where classroom based learning still predominates, such as in the schools sector, then observation techniques (and in particular use of video) have continued to develop and improve, such as in the Interactive Education project led by Professor Ros Sutherland[2] However, in this study, the team worked on the assumption that the classroom was not the only or even necessarily the main location for student study and therefore we needed an alternative to standard observation techniques. Initially, we planned to include some questions in the second questionnaire for students on which areas of the VLE they had used and for what purpose, what activities they had been doing during the course and for how long. However, after discussion, this approach was thought to be flawed as the students would be unlikely to remember their work patterns in sufficient depth. As an alternative, we chose to ask students to keep a diary for two separate weeks during the course, offering incentives in the form of book tokens. A simple template was provided which was trialled with students at the University of Bristol. We were aware that attempting to gather data in this way might prove difficult, that students might forget or be unwilling to

[2] See http://www.interactiveeducation.ac.uk/default.htm

complete the diaries, therefore email reminders to students were also built in to the design to help jog memories and provide support.

The response rates for the dairies were in the main, very disappointing with several studies obtaining little or none of this data, despite the support of tutors and a number of email reminders by the researchers. There was a notable exception to this - case study 6 (Psychology) where a good proportion of diary 1(35 returns - 27% of participants) was returned and a smaller number of diary 2 (19 returns -15% of participants) were collected. These were considerably higher than the negligible returns from other studies as shown in table 3 below .(Note: that case study 3 were postgraduates and only 7 students were involved in the course.)

Case Study	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Diary 1	4	0	5	5	7	35	0	9	0
Diary 2	1	0	3	0	1	19	0	4	0

Table 3: The number of participants in each case study who completed diaries.

It is also worth noting that a good response was not evident in both Psychology case studies. One factor that might be considered as a reason for the higher returns could be that Psychology students are more used to research studies and volunteering as participants, however the fact this is not the case for the other Psychology case study (5) makes this less likely. A higher return in case study 6 might also have some connection to the fact that the students were studying a unit on research methods. These students may have felt more empathy with the research and identified the study as more related to their practice. However, when asked about this, during their interviews, most of the interviewed students could not provide an explanation. From this experience, it can be concluded that this method proved to be very poor at gathering meaningful data and alternatives are needed to explore actual student experience successfully and appropriately.

Structured interviews and critical incidents

Interviews formed a substantial part of the data gathering, tutors were interviewed (before and after the unit) and a small group of students from the cohort were intereviewed at the end or near the end, depending upon exams and other constraints. A clear interview structure, pro formas and stimulus materials were developed to ensure (as far as possible) that the indidivual research teams followed a common format. Interviews were piloted by staff and students at University of Bristol and amended accordingly. The interviews for tutors and students after the unit, utlised the Critical Incident Technique pioneered within Hospitality Management Education by one of the research team (Gilbert and Lockwood, 1999). The technique was originally developed for the aviation industry by Flanagan (1954) in order to identify behaviors that contribute to the success or failure of individuals or organizations in specific situations.

The interviews have produced some of the richest data for the study to draw on and secondary analysis of the critical incidents across all the studies is now underway and will be reported elsewhere. As well as the exploration of critical incidents, the interviews with students also included a set of statements on cards to prompt more in depth discussion on some of the interviews. Statements such as: *"We didn't need a tutor on this course"* and *"Working online is all about working on your own"* were presented. Students were asked to think for a moment and then place the card on a line with a 5-point Likert scale from strong agree to strongly disagree and briefly explain their choices. This produced some very insightful comments by students and it is particularly noticeable that in some cases these were from students who found it difficult to identify critical incidents to focus on in earlier parts of the interview. In the light of this, it might have been beneficial to interview students at more than one point during the course and perhaps to have tracked a small group of students throughout, rather than attempting to track the whole group.

Discussion Data and Transaction Log Analysis

Wherever feasible discussion data (on discussion boards and email) and transaction log data were recorded during the course units and collected afterwards. This was not always possible due to VLE constraints (some VLEs have no transaction data, some do not record email exchanges) and institutional constraints (negotiating to obtain data sometimes proved technically, administratively or ethically problematic). The quality of transaction data was sometimes variable, being recorded in different ways, making it difficult to compare formats. The data was also a challenge to interpret, for example the 'numbers of accesses' does not necessarily tell you very much about what a student is actively doing (reading? interacting? scanning?). However, this data proved invaluable in identifying broad patterns of use, particularly where few student diaries had been returned. One clear advantage of being able to analyse this data is that it includes all students, not just the ones who participated in the questionnaires and interviews, and in the Economics study this allowed us to identify both case studies' overall patterns of use, as well as correlating the transaction data with the questionnaire data and identifying patterns of use in gender and first language.

Discussion data was also collected from one of the Economics case studies, which was used as the basis of the discourse analysis study SOLE has undertaken. The data was partly imperfect as it excluded email data exchange between the tutor and students (and between students and students) and it became clear that some exchanges on the discussion board were initiated or followed up via email. Nevertheless this data allowed us to study communication patterns (including modes of address), roles and authority in depth, extending our understanding of issues already identified from other parts of the study.

MULTIDISCIPLINARY, COLLABORATIVE WORKING

The collaborative and multidisciplinary aspects of the study and their contribution to the project will now be discussed. The widely distributed team included researchers from each of the LTSN (Learning and Teaching Support Network) centres represented by the subjects included in the study. This allowed the project to draw on a diverse set of skills and expertise, approaches and theoretical perspectives. Wenger (1998, p73) has suggested that there are three dimensions to a community of practice – mutual engagement, a joint enterprise and a shared repertoire. In considering how far our multidisciplinary team achieved a community of practice, these three dimensions will now be considered. Most members of the team had either direct connections with the LTSN centre they represented (i.e. they worked there) or were closely associated and had a good understanding of their work. An early meeting of the team, together with this background helped ensure that we had a common understanding of what was to be achieved and shared goals for the project. A series of well attended and very focussed meetings helped to maintain momentum and ensure that the project progressed, whilst the use of Blackboard as a shared space for documents, organizing meetings and announcements has provided invaluable ongoing opportunities for sharing. It should also be added that early delays with the project resulted in a sense of urgency, which also became a contributing factor in ensuring that we maintained our focus. These factors seem to correspond well to Wenger's first two dimensions. The third dimension " a shared repertoire" has emerged, it could be argued from participation in the project. Initially whilst the team all had a strong interest in teaching and learning, as evidenced by an association with the LTSN network, their expertise was quite diverse and the range of disciplines represented by the team, whilst all highly relevant to the study, were also diverse. The discipline differences were apparent but the team have learned a great deal from each other and the multidisciplinary approach, including new data collection methods and techniques, data analysis expertise, experience as a tutor (and student) in a range of subjects, national and institutional perspectives. Whilst there was much common ground, there were also some differences in philosophies, ideas and norms which led to some areas of contention and the need to learn new skills, for example, in either quantitative or qualitative data analysis. However, this has proved a very valuable learning experience and the whole team has benefited from listening and learning from other disciplines.

Cantu (1997) in her work on virtual teams suggests that trust, expectations, work co-ordination, group dynamics and leadership are all contributors to the success or failure of virtual teams but that successful planning and design are critical to their success. Whilst all these elements could be argued to have been present in face to face meetings, there were some difficulties in maintaining momentum through virtual communications as everyone on the team has a high workload and SOLE was one small part of this. Operating as a virtual team resonates strongly with the experience of the research subjects we were studying and the need to maintain communication and engagement are the same for virtual research teams as for any other online community. It is also worth noting that communication online through our shared space has diminished as the project has progressed and the objectives became clearer and more individualized,. In the early stages of the project when the design of the research study, methods and data collection were all the focus of attention, more collaboration was required and participation was more frequent.

CONCLUSIONS: WHAT WORKS?

.Overall we have concluded that the methodology and mixed methods strategy worked well because of the range of approaches and levels of data collection. If we had been reliant on one or two of the methods described, there could have been serious difficulties in obtaining sufficient data. In some studies (e.g. Economics), it was possible to obtain both transaction log and discussion board data but the number of diaries collected was very poor. In other studies, (e.g. Psychology) the reverse was the case. Arranging interviews with students was challenging for some studies where students did not agree to be interviewed or did not turn up as arranged. Furthermore, there were different successes in different subjects and to an extent these were intrinsic to the subject, for example the diaries were more successful with Psychology students, education students were more interested in discussing the issues around online learning as it directly related to their practice. Guba & Lincoln stress that “human knowledge consists of a series of constructions, which precisely because they are human generated are problematic, that is indeterminate, unsettled and ambiguous.” (1989, p68). What was clear from the reflections of the researchers themselves was that local conditions, including the needs and attitudes of some stakeholders, were usually the biggest constraints on the methodology. For example, in one of the studies, the tutors felt strongly that they should organize the student interviews themselves. These were then run as a recorded focus group without an interviewer present, rather than the one to one interview format laid down in the SOLE methodology guidelines. Another example of local conditions was that in one of the studies, the students only met twice at the beginning and from then on worked in student teams. Because they also did not communicate regularly through the VLE or email, it made it very difficult for the researcher to administer the second questionnaire, collect diaries and arrange interviews. This means that pragmatic decisions (as in the “mixed methods pragmatic paradigm”) had to be made to ensure that the individual case studies could adapt the methodology to deal with the constraints they faced.

The weak link in the methods adopted was the student diaries, as previously discussed. In any further work, we will need to consider other self-reporting methods such as audio reports, regular interviews or focus groups or possibly video diaries, although there are obvious resource constraints that would have to be overcome for this to succeed. The questionnaires were successful in providing the kind of quantitative data and some qualitative responses but our methods of administering them could have been more robust. The level of absenteeism was much higher than expected and doing these during lecture or class time may have affected the level of response. In any further work, consideration should be given to following up absentees immediately to improve response rates, offering alternative data capture mechanisms (e.g. online forms) and providing opportunities for reflection or alternatively considering whether other methods such interviews at several stages or the use of focus groups and techniques such as nominal group technique might be more appropriate to encourage deeper involvement and reflection by students.

The problems encountered in administration and local variations in conditions for the case studies might lead one to question the worth of large-scale studies of this kind. However, a more comprehensive evidence base is now demanded (DfES, 2003) in order to guide elearning strategy, design and models

and this requires a scaling up of activity from the local, institutionally based evaluations that have predominated in recent times. Apart from enabling a larger scale study, one of the most positive aspects of the approach taken during this project, has been the collaboration and shared knowledge and expertise across a number of subject communities through the distributed research team. This has resulted in a large body of evidence (9 case studies to date with 3 more to come) and an increased repertoire of evaluation and research expertise, which can now be cascaded back into the subject communities. In this way, it may represent a useful model for other large-scale studies to consider.

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